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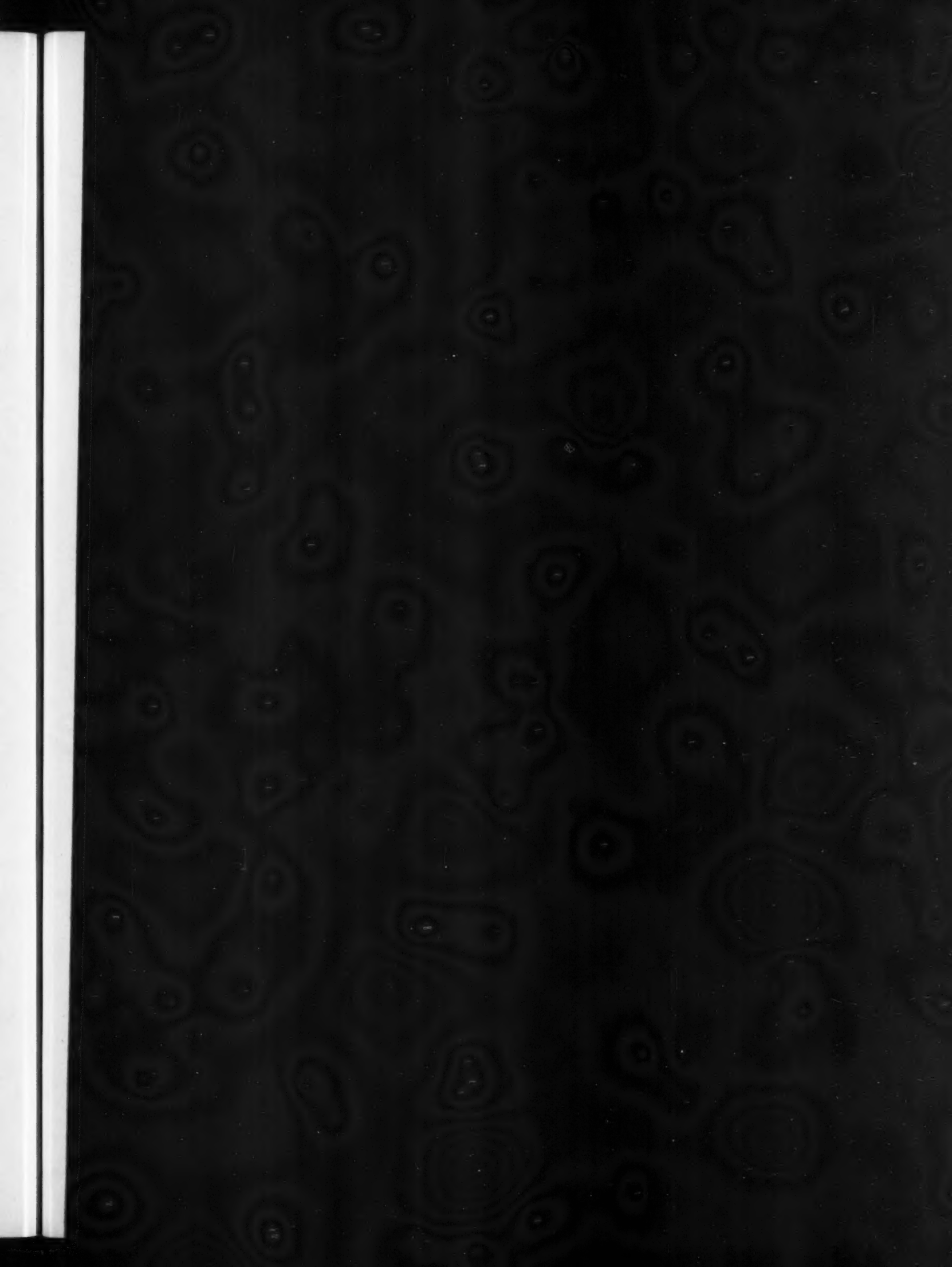

THE

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WITH WHICH IS INCORPORATED

The Engineers', Architects' and Builders' News

VOLUME XX. SAN FRANCISCO, CAL., JANUARY 11, 1908 No. 2

HIGH POWER HARBOR CRANES.

One of the most useful of all modern hoisting equipments for harbor use is the floating crane, as it may easily be moved to any point desired and is quickly in position to move the heaviest loads with safety and economy. For repairs the great floating and other cranes can handle yachts or launches without difficulty. Steam power is almost universally employed for this service, as current cannot readily be obtained on the floating crane from power plants on shore without considerable expense for cables, and the difficulties in handling same, which would be prohibitive.

FLOATING CRANE AT IMPERIAL DOCKYARD AT KIEL, GERMANY.

The accompanying illustration shows a floating crane of 100 tons' lifting capacity in service at the Imperial Dockyard at Kiel, Germany, a similar floating crane also being used at the Wilhelmshaven Imperial Dockyard. It can be moved by its own power at a speed of 3 to 4 knots per hour, and is provided with two sets of tackle for 8 tons and for 30 tons. The pontoon supporting this crane is nearly 151 feet long and about 60 feet wide, with a height of a trifle less than 10 feet, and the highest position of the hook above the sea level is 98 feet 5 inches for one set of hoisting tackle, and 121 feet 5 inches for the lighter set of tackle.

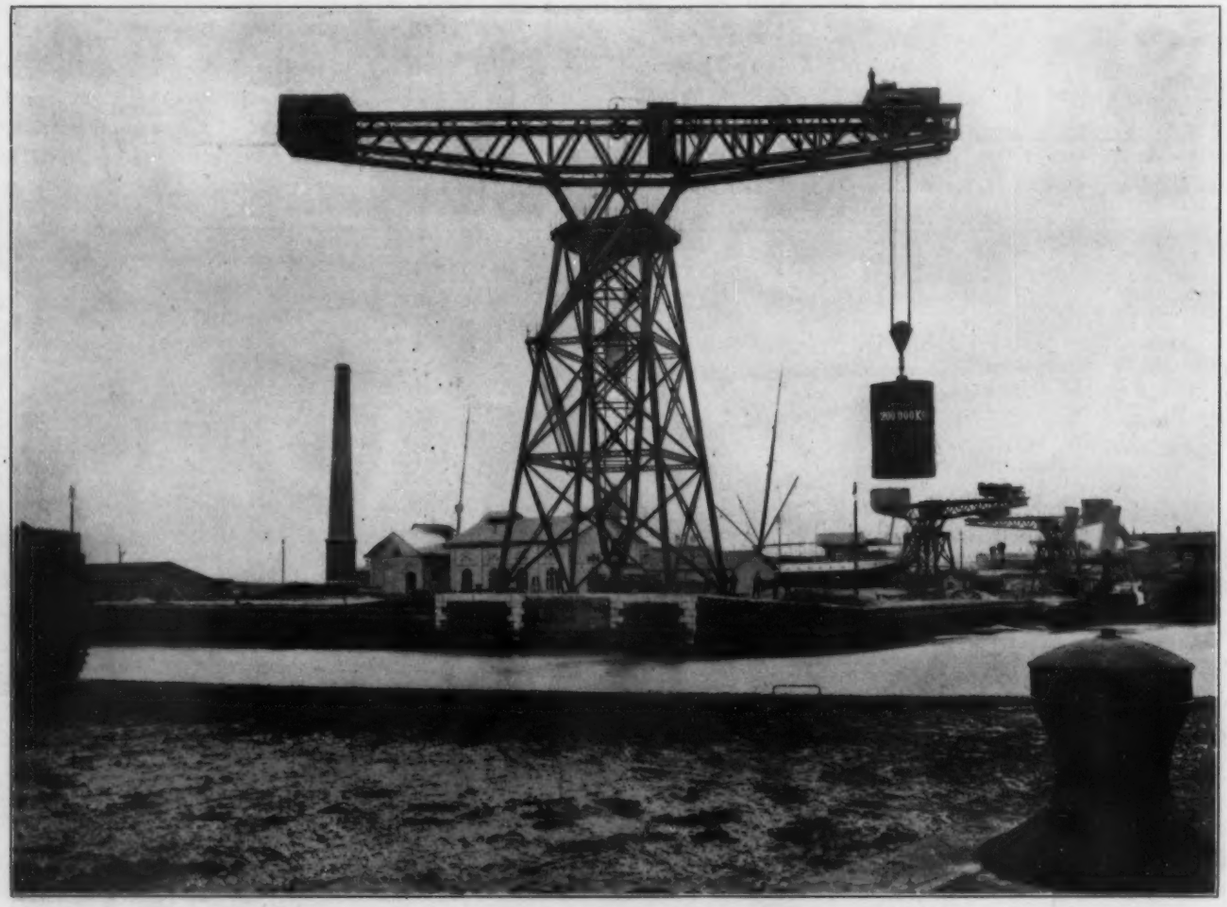
It is stated that the time taken to lift 100 tons to a height of about 100 feet by this floating crane is 30 minutes, and the radius of action outwards from the front edge of the

pontoon is about 36 feet and inwards about 20 feet, with a load of 200,000 pounds.

There are similar cranes of 150 tons' capacity in operation in the harbors at Glasgow and Hoboken, as well as Vegesack, also in China at the harbor of Tsingtau. The latter was installed by the Duisburger Maschinenbau-Actien Gesellschaft, formerly Bechem & Keetman, and the former by the Benrather Maschinenfabrik.

The accompanying illustration shows the construction of the great electric rotary cranes at Bremerhaven, Germany, having a lifting capacity of 150 tons and 50 tons, the two plants in the shipyards, far from electric central stations supplying current for commercial light and power service in the cities so equipped. The great rotary crane noted in the accompanying photograph located at the "Howaldtswerke," at Kiel, has a capacity of 150 tons, the radius of action with this maximum load being 65 feet 7½ inches, while the lighter hook and hoisting mechanism is capable of lifting 50 tons, with a maximum radius of action of 134 feet 6 inches, the smallest radius being 26¼ feet.

The total height of this electric rotary crane is 154¼ feet, while the height of the trestle is a trifle over 119 feet.



ELECTRIC ROTARY CRANE AT BREMERHAVEN.

in the background being noted without load, and the crane in the foreground having a maximum load of 200,000 kilograms suspended at its full radius of action. The smaller cranes each have a capacity of 100,000 pounds, with a total height of 38 feet 9 inches and radius of action of 39 feet 4½ inches, while the height of the bridge is 26¼ feet.

The largest crane shown in the foreground, carrying a test load of 200 tons, is 114 feet 10 inches high and is capable of covering an area of 1,819 square feet with the trestle, which is 85 feet 11½ inches from the ground. It has a total radius of action of 72 feet 2 inches.

Some of the largest stationary harbor cranes of the great European countries are operated electrically from power The electric motors are mounted on the trolley, tower and bridge of the crane, and the controlling mechanism is installed in the cabing on the top of the crane.

The structural steel work of this crane was made at the Gutehoffnungshutte, at Oberhausen, for the Benrather Maschinenfabrik. It is maintained that where electric current can be obtained at reasonable rates from a central power station or be supplied from an electric plant also used for lighting service and motor service in the shipyard or harbor, the electric propulsion of portal, semiportal and other dock cranes, as well as tower, jib and traveling cranes, is not only most economical, but most satisfactory in operation, being easily controlled with the least amount of labor and maintenance.

ENERGY TRANSFORMATIONS FROM THE ELECTRICAL ENGINEERS' STANDPOINT.*

By H. M. Hobart.

(Continued.)

When, however, we wish to convert heat into electricity, or into work, high efficiencies are not attainable. There are no known means of transforming heat directly into electricity on a large commercial scale. Heat may, with a low efficiency, be transformed into work in a steam engine or a gas engine, and the work may, at high efficiency, be transformed into electrical energy. The large portion which, in the first step, is not transformed into work, remains heat; the small part which, in the second step, is not transformed into electricity, is converted into (or lost as) heat. Of the heat absorbed by a large steam engine or steam turbine, during the passage of the steam, only some sixty per cent can, in the present state of the art, ultimately be converted into electricity.

When we trace the process back to the calorific contents of the fuel, it may be stated that only about 7.5 per cent can be converted into electricity. With gas engines, some twenty-five per cent of the calorific value of the fuel may be transformed into electricity in the circuits supplied from the dynamo driven by the engine. The greater efficiency of the gas engine is, however, in large units, offset by the greater cost, greater depreciation and greater space required, as also, in many cases, by the disadvantage associated with its less uniform turning moment and its less reliability at the present stage of its development.

Let us therefore direct our attention to the steam engine or steam turbine, which, as already stated, permits, in large sets, of converting into electrical energy some sixty per cent of the energy abstracted from the steam in its passage through the engine.

In accordance with this definition of the efficiency of an engine, the heat rejected to the condenser is not regarded as a loss.

It may be, for instance, and often is, employed in heating

TABLE VIII.

Table of the Energy in Kilowatt-hours Required to Convert One Ton of Water at Zero Degrees Centigrade into Steam at Various Temperatures and Pressures.

Absolute Pressure in Kg. per Sq. Cm.	Temperature of Vaporization in Deg. Cent.	Steam Heat of Saturated Steam in Kw.-Hr. per Ton.	Steam Heat (in Kilowatt-Hours per Ton) of Steam Superheated to Following Final Temperatures in Deg. Cent.							
			100 Deg.	150 Deg.	200 Deg.	250 Deg.	300 Deg.	350 Deg.	400 Deg.	450 Deg.
A	B	C	D	E	F	G	H	K	L	M
0.02	17	700	747	775	803	831	859	885	913	940
0.04	29	704	747	775	803	831	859	885	913	940
0.06	36	709	747	775	803	831	859	885	913	940
0.08	41	713	747	775	803	831	859	885	913	940
0.10	46	716	746	774	802	830	858	884	912	940
0.12	49	717	746	774	802	830	858	884	912	940
0.15	54	720	746	774	802	830	858	884	912	940
0.20	60	724	746	773	802	830	858	884	912	940
0.25	65	725	745	773	801	824	858	884	912	940
0.30	69	727	745	773	801	824	858	884	912	940
0.35	72	729	745	773	801	824	858	884	912	940
0.40	76	730	745	773	801	824	858	884	912	940
0.50	81	733	744	772	800	828	857	883	911	939
0.60	86	736	744	772	800	828	857	883	911	939
0.70	90	737	744	772	800	828	856	883	911	939
0.80	93	739	744	771	800	827	856	883	911	939
0.90	96	740	744	771	800	827	856	883	911	939
1.0	99	741	742	770	799	826	855	882	911	938
1.1	102	743		770	799	826	855	882	911	938
1.2	104	745		770	799	826	855	882	911	938
1.4	109	746		770	799	826	855	882	911	938
1.6	113	748		770	799	826	855	882	911	938
1.8	116	750		770	799	826	855	882	911	938
2.0	120	752		769	798	826	854	882	911	938
2.5	127	754		768	797	826	854	881	911	938
3.0	133	756		767	796	825	853	881	911	938
3.5	138	758		766	795	825	853	880	911	938
4.0	143	759		764	794	824	852	879	910	938
4.5	147	761			794	824	852	879	910	938
5.0	151	764			794	824	852	879	910	938
5.5	155	766			794	824	852	879	910	938
6.0	158	767			793	823	852	879	910	938
6.5	161	767			792	822	852	879	909	938
7.0	164	768			791	822	851	879	909	938
7.5	167	769			790	821	851	879	909	938
8.0	170	770			789	820	850	879	908	937
8.5	172	771			789	820	850	879	908	937
9.0	174	771			798	820	850	879	908	937
9.5	177	772			798	820	850	879	908	937
10.0	179	773			787	819	849	878	908	936
11.0	183	775			786	819	849	878	908	936
12.0	187	776			785	818	848	878	907	936
13.0	191	777			784	817	848	878	907	936
14.0	194	778			782	816	847	877	907	936
15.0	197	778			781	815	846	877	906	936
16.0	200	779			779	813	845	876	905	935
18.0	206	780			779	812	844	876	905	935
20.0	211	781			779	811	843	815	905	935

Wet steam. Wet steam.

processes. Waste-heat engines have also been devised for employing the lower temperature ranges. Whether or not it be expedient further to employ the heat energy rejected to the condenser, it is nevertheless heat energy. Subtracting this energy from that contained in the steam at admission, we have as the remainder the energy which has undergone transformations in the steam engine or turbine. A large portion of this has been converted from heat energy into useful work energy, and the remainder is ultimately wasted in heating the engine and the surroundings.

TABLE IX.

Wetness Factors at Exhaust for Steam Expanded Adiabatically from Various Initial Temperatures and Pressures.

Exhaust Pressure in Kg. per Sq. Cm.	Admission Pressure in Kg. per Sq. Cm.																							
	16				14				12				10				8				6			
	Admission Temperature in Degrees Centigrade.																							
	200	250	300	174	200	250	300	187	200	250	300	179	200	250	300	170	200	250	300	158	200	250	300	Wetness Factors.
0.05	0.24	0.21	0.19	0.23	0.23	0.21	0.18	0.23	0.22	0.20	0.17	0.22	0.20	0.18	0.16	0.22	0.20	0.18	0.15	0.20	0.18	0.15	0.13	
0.1	0.23	0.20	0.17	0.22	0.22	0.19	0.16	0.22	0.21	0.18	0.15	0.21	0.19	0.16	0.14	0.20	0.18	0.14	0.13	0.18	0.16	0.13	0.10	
0.2	0.21	0.17	0.14	0.19	0.19	0.16	0.13	0.19	0.18	0.15	0.12	0.18	0.17	0.14	0.11	0.17	0.15	0.12	0.09	0.16	0.13	0.10	0.07	
0.4	0.18	0.14	0.11	0.16	0.16	0.13	0.10	0.16	0.15	0.12	0.09	0.15	0.14	0.10	0.08	0.14	0.12	0.09	0.06	0.12	0.10	0.07	0.04	
0.6	0.17	0.13	0.09	0.15	0.15	0.11	0.38	0.15	0.13	0.10	0.07	0.14	0.12	0.09	0.06	0.13	0.11	0.08	0.04	0.11	0.09	0.05	0.01	
0.8	0.16	0.12	0.08	0.13	0.13	0.10	0.07	0.14	0.12	0.09	0.06	0.13	0.11	0.08	0.04	0.11	0.09	0.06	0.03	0.10	0.07	0.04	....	
1.0	0.14	0.10	0.07	0.12	0.12	0.09	0.06	0.12	0.11	0.08	0.04	0.12	0.10	0.07	0.03	0.10	0.08	0.04	0.05	0.09	0.06	0.02	....	
1.5	0.11	0.08	0.05	0.11	0.11	0.07	0.04	0.10	0.09	0.06	0.03	0.09	0.08	0.04	0.01	0.08	0.06	0.03	....	0.07	0.04	....	....	

Note.—The values for steam initially saturated are set in h Wetness Factors.

The ratio of the energy delivered from the engine as work, to the energy which has been absorbed in the engine, is designated the "thermodynamic" efficiency. In Table VI are set out the amounts of "convertible" energy per ton of steam when working between various admission pressures and temperatures and various exhaust pressures. With an engine of sixty per cent "thermodynamic" efficiency the work energy obtained per ton of steam is equal to 0.60 of the "convertible" energy set forth in the table.

The values obtained in the table are determined on the assumption of expansion without loss or gain of energy by the steam. Its temperature during this process of so-called "adiabatic" expansion decreases in accordance with definite thermodynamic laws into which it is not proposed to enter. Accompanying the decrease in temperature there is, for certain ranges, a condensation of a portion of the steam. The corresponding "wetness factors" are set forth in Table IX.

It is the writer's experience that by means of the system and tables above set forth the general problems associated with electricity supply and distribution may be solved more effectively than is otherwise possible. Calculations which, by older methods and mixed units, have been tedious and involved, may be readily carried out and the significance of each stage of the calculations becomes much more evident.

Since, however, the designation "kilowatt-hour" is illogical and obscure, it is highly desirable that it be replaced by some suitable name. It has been suggested (editorial in the London Times Engineering Supplement for August 7th, 1907), that this quantity might be termed a "kelvin" or a "kapp." The latter term would be ideal from the standpoint of brevity. The energy in one ton of good coal is some eight to nine "kilokapps." At a price of $3.50 per ton, this works out at some forty-four cents to thirty-nine cents per "kilokapp." If the annual over-all efficiency of an electricity supply station is, in some particular case, ten per cent, then the fuel cost per "kapp" delivered at the outgoing cables is some forty cents. The remaining running costs would raise this to a total of some sixty cents for the total operating costs. If, with fifty-per cent load-factor, 200 million "kapps" are delivered annually from the generating station, the capital cost for a station designed on modern lines works out at some $15,000 per million "kapps" per annum. On the basis of seventeen per cent for interest and depreciation, this constitutes an annual charge of twenty-six cents, thus bringing the total cost per unit up to about eighty-six cents per "kapp" delivered from the generating station. By similar calculations for the cost of cables, sub-stations and low-tension network and for the cost of the energy wasted in these components of the system, the cost delivered to the consumer may be estimated.

If the proposal to substitute the short word "kapp" for the kilowatt-hour does not find acceptance, the above ready means of following through such calculations are not invalidated and it is merely required to substitute in the text the usual term kilowatt-hour.

CIVIL SERVICE EXAMINATIONS.

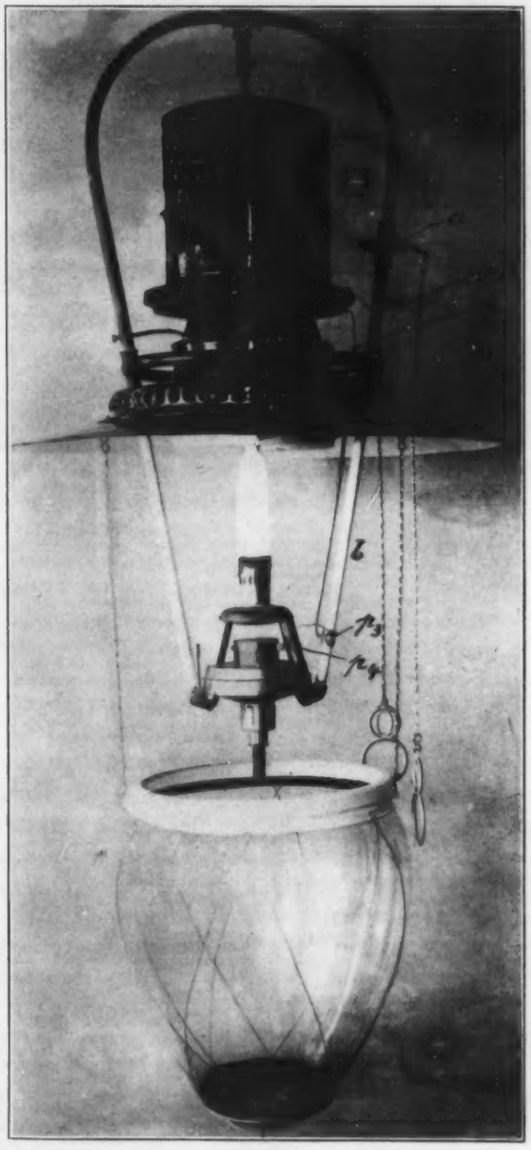
The United States Civil Service Commission announces an examination on January 29-30, 1908, to secure eligibles to fill a vacancy in the position of topographic draftsman, $900 per annum, in the Coast and Geodetic Survey, and vacancies requiring similar qualifications as they may occur in any branch of the service. The salary for the position of topographic draftsman ranges usually from $1,000 to $1,500 per annum, and for copyist topographic draftsman from $900 to $1,500 per annum.

An examination will be held January 29-30, 1908, to secure eligibles from which to make certification to fill at least three vacancies in the position of miscellaneous computer, Naval Observatory, Washington, D. C., and vacancies requiring similar qualifications as they may occur in that observatory. The Department states that miscellaneous computers are paid by the hour and earn from $1,000 to $1,200 per annum. Promotions are made from this grade, without further examination, to the grade of assistant, at $1,200 per annum, as vacancies occur. The examination will consist of the subjects mentioned below: Pure mathematics, including geometry (plane and solid), algebra, trigonometry (plane and spherical), and calculus, all as covered in the higher-class text-books; astronomy (elementary questions in spherical and general astronomy); practical computations, involving mathematical and astronomical knowledge as indicated under the subjects of pure mathematics and spherical astronomy, but especially designed to test the competitor's ability to use tables of logarithms quickly and correctly; training and experience (rated with special reference to the class of work involved).

A NEW GAS LAMP.

By Hugo Brunnsburger.

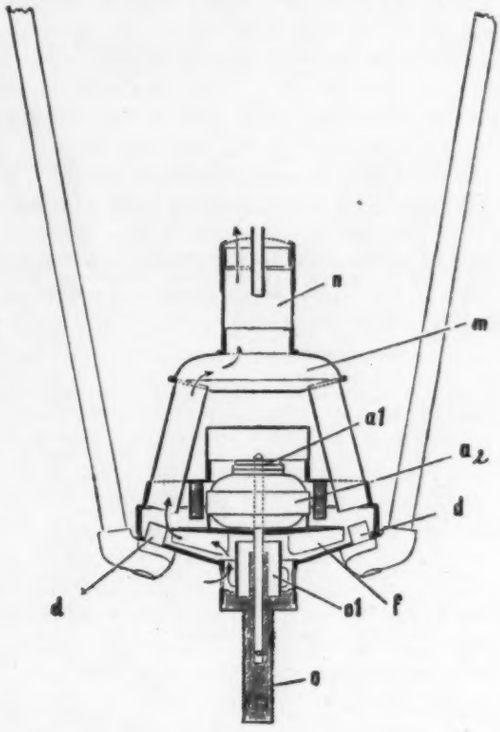
Various means for increasing the supply of air to incandescent gas lamps have been recently devised. Welsbach employed an injector effect, and Lucas a long chimney. Other systems, invented under the name of compressed gas, are based on an artificial supply of compressed air. One way



proposed is to leave the producing plant and pipe lines unchanged, but to employ small fans to suck large quantities of air. The power to rotate these fans is taken from the heat of the lamp. Lucas has recently solved the problem in a simply ingenious way.

The new invention uses thermal electricity, developed by copper, nickel and aluminum, to propel a small electromotor with fan.

The gas goes through the cock **a** and the pipe **b** into the casing of the electromotor, through this into the top of the burner and mantle. Above the latter, within the chimney, is the thermo-element **c**. Here the electric energy is generated by the heat of burned gases and is conducted through the poles p_1 and p_2 to the poles below p_3 and p_4; from these it enters the motor. Two small silver brushes rest upon the collector of the armature. The latter is mounted on a vertical shaft which runs in a box-bearing entirely in oil. Coupled to the armature, a_2, is the small fan with its wings, **f**, so that during rotation the wings draw air through the openings o_1 and push along a curved way up to the



mantle, as shown by the arrows. Thus the atmosphere mixes with the escaping gas and proceeds under increased pressure to the mantle, there producing a theoretically complete combustion. At **o**, a bushing is arranged, which can be screwed up and down in order to regulate the incoming air by enlarging or diminishing the air holes. The only rotating part is the small electromotor and fan, which both form one piece, running with a speed of 2,000 revolutions per minute. The thermo-element is made from alloys which stand a temperature of 1,200 degrees, but these are subjected in this lamp only to about 600 degrees, so that the element will have a long life.

The new lamp is of small size and can be built for pipes hanging from the ceiling or as a wall-candelabra or be placed upon a vertical post, for exterior as well as interior. It is rain and storm proof and can be ignited by pulling a chain. It is claimed that the lamp is remarkably efficient.

MEETING NOTICE.

The next meeting of the New York Section of the Illuminating Engineering Society will be held at 8:15, Thursday evening, January 9th, 1908, in the United Engineering Societies Building, 33 West Thirty-ninth Street. Dr. H. H. Seabrook will present a paper entitled "Light and the Eye."

THE HEATING OF ENCLOSED MOTORS.

By A. G. Wessling.

In the design of electric motors, whether to be driven by alternating or direct current, the question of heating is of utmost importance, because the temperature at which the machine operates directly affects the length of its life. Since most insulating materials become charred at temperatures of 100 degrees centigrade or over, this limit should not be exceeded, and the lower the temperature can be kept the longer will be the motor's usefulness. Great progress has been made in the matter of ventilating all types of electrical machines.

At present many machines include in their construction regular fan blades attached to the revolving element, which produce a forced draft through numerous air ducts in the stationary element. Of course attention is given to reducing the losses whereby the heat is produced, to a minimum. It is not economical, however, to carry this reduction beyond a certain limit, which for ordinary machines may be roughly taken as being 10% of their rated capacity. The dissipation of heat is more rapid with increase in speed in open types. For a given rise in resistance the number of watts which may be dissipated per square inch is almost directly in proportion to the speed. It is evident, therefore, that by doubling the speed of a given machine its output may be doubled with practically the same rise in temperature.

In the case of motors which are tightly enclosed, the heat generated cannot be so readily disposed of, as all of it must be transmitted to the outer shell and thence radiated. As the rate at which heat is radiated from a given metallic shell depends only upon the difference in temperature between the shell and the surrounding air, it is evident that for a given rise in temperature the total number of watts which can be radiated from a given frame is fixed. Since the losses in a motor may be taken as ten per cent of its rated capacity, it would seem that a given frame could be used for but one rating with a given rise in temperature. If the motor were a solid mass of metal in which the heat were generated uniformly, and if the temperature of the outside surface were the measure, this would be true, but in the actual machine most of the heat is generated in the armature and must be transmitted through a long air space to the outer shell. The rate of transmission from armature to shell is affected by the distance between the two and by the peripheral speed of the revolving element. The capacity of the motor can therefore be increased as the speed is increased, but not in the same ratio.

In hot places there is great danger that the motor temperature will exceed the 100-degree limit. To simply operate the motor at light load is not sufficient to guard against overheating, because the losses which vary with the load are but a fraction of the total losses, and a motor which does not exceed 65 degrees rise when loaded may exceed 55 degrees when running idle.

It is evident, therefore, that an installation of enclosed motors will be much more expensive than if open motors are used. For the motors must be approximately one-third larger, which will increase the cost by about the same amount. Being special in construction, the price will be still higher for that reason. And because the operating temperature will be so much higher, the charge for depreciation should be at least doubled. In view of these facts, the enclosed type of motor should only be used when absolutely necessary.—The Sibley Journal of Engineering.

COPPER MARKET SITUATION.

Manufacturers of wire and copper goods operate cautiously, but they are looking forward to a gradual improvement some time in the future. The return to normal conditions, however, will be slow, as there must be a more complete restoration of confidence before new enterprise will be embarked upon with earnestness. No one can doubt but that there will be an entire clearing up of the situation eventually, and this is the cheering feature we are all anxiously looking forward to, but our patience may be put to a few more tests while we are waiting for the elimination of the weak spots.

The local copper market remains dull, and domestic buying is for limited quantities. Consumers continue to buy from hand to mouth, and while this policy prevails it is hard to see how values can be advanced to a level not justified by trade conditions. Electrolytic Wire Bars are quoted at 13½ cents, with recent sales reported in both the domestic and foreign markets from 13 @ 13½. Some special business was said to have been on a higher basis.

The curtailment of copper production at some of the principal mines in the West and in Mexico is considered a wise measure, and this action should go far in preventing further market demoralization. The restriction in output is radical enough to allay the fear of another serious accumulation of stocks such as occurred in the third quarter of the year. If demand gradually improves, consumption ought to prove about equal to the reduced product now available.

Stocks of raw material in the hands of manufacturers are light, and under the influence of a conservative conduct of their business supplies will probably be kept very close to the limit of actual requirements for some time to come. This policy will keep matters on a healthier basis, and when the present financial and commercial disturbances are past, manufacturing plants will be better prepared to move ahead on a more extensive scale.

It is not to be supposed that conditions will suddenly improve for the better. It will take time for business to find solid footing to rest on again, and there is likely to be more commercial and industrial retrenchment before complete recovery sets in. But the slowing down process has started the cure, and the disease of over-expansion must be thoroughly checked before business reaches a safe and normal plane. Credits were stretched to the utmost danger point, and people were rushing on without attaching sufficient importance to the financial reckoning day that was sure to follow. Unconservative business and banking methods have brought forth their legitimate fruit, and we must be exceedingly careful as a nation not to repeat the same errors of judgment and practice in the future.

Present market prices for copper would no doubt prove satisfactory enough to manufacturers were demand at all encouraging, but with the small volume of current orders buying is not of a stimulating character. When the consumer has the trade he will pay any reasonable price for copper without objection. But what he wants to see is a condition of market stability that will not leave him in a position where he will be made to suffer as the victim to the caprice of mere manipulators. Fluctuations of 12 cents a pound in the price of copper inside of a few months is too violent for the healthy conduct of any business.—Copper Gossip.

60TH CONGRESS,
1ST SESSION.

S. 2661.

IN THE SENATE OF THE UNITED STATES.

DECEMBER 17, 1907.

Mr. CRANE introduced the following bill; which was read twice and referred to the Committee on Public Lands.

A BILL

Granting locations and rights of way for electric and other power purposes through the public lands and reservations of the United States.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the right to locate upon, and the right of way through, the public lands and reservations of the United States, excepting lands reserved for military or naval purposes, national parks, or national cemeteries, is hereby granted to any citizen or citizens of the United States, or corporations organized under the laws of any State or Territory which shall have filed with the Secretary of the Interior a copy of its articles of incorporation and due proofs of its organization under the same, their successors or assigns, for the construction, maintenance, and operation of electric and all other water-power plants and appurtenant structures, including canals, tunnels, flumes, pipe lines, or other water conduits, dams, reservoirs, and pole lines, to the extent of the ground covered thereby and fifty feet on each side thereof, together with fifty feet from the marginal limits of such buildings, structures, dams, and reservoir sites, together with the right to cut adjacent timber, subject to the conditions hereinafter expressed, where such timber would endanger such line or works, and to submerge and flood such areas as are shown and described upon the maps filed, as herein provided, and as may be necessary to impound the water in such reservoirs; also the right to take from the public lands adjacent to such works, materials, earth, and stone necessary for the construction and maintenance thereof: Provided, That the rights herein granted shall not be construed to interfere with the control of water for irrigation and other purposes under authority of the respective States or Territories.

Sec. 2. That any such person, association, or corporation desirous of securing the benefits of this Act shall file with the register of the local office for the district where such land is situated a map, in duplicate, showing the location and area required for the purposes herein provided, which shall thereupon be noted upon the plats in said office. And if the application be in accordance with the terms of this Act such map shall be approved by the Secretary of the Interior. From and after the filing of said map as aforesaid, lands over which said rights of way shall pass shall be disposed of only subject to such rights of way: Provided, That the lands covered by any structure or reservoir, or the site therefor, shall not be disposed of except to such grantee, his successors or assigns, unless forfeited as in this Act provided, and the same may be purchased by the grantee, his successors or assigns, after completion of such structures or reservoir, or any completed portion thereof upon the completion of such portion, at the price of two dollars and fifty cents per acre, and upon survey thereof patent shall issue therefor: Provided, also, That the right to the continued use and enjoyment of all the property, privileges, and rights of way hereby granted shall remain and continue in such grantee, his successors or assigns, from and after the date of the filing of said map or maps as above provided, and shall vest upon the completion of the same, or as to any such part shall vest upon completion of any part or portion thereof, as of the date of the filing of such map. But unless said grantee, successors, or assigns shall, within sixty days after the filing of such map, except where prevented by the elements, order of court, or other like cause, commence and continuously and in good faith prosecute to completion the works or structures for the diversion and use of such water and power, then and forthwith upon failure so to do all rights as to any uncompleted portion of said work or works and the sites and rights of way covered or claimed shall be forfeited without further action by the Interior Department, unless for cause shown the Secretary of the Interior shall extend the time, but said grantee, his successors or assigns, may within two years thereafter remove all structures and property from such uncompleted portion of such sites or rights of way: Provided, That work done upon and in connection with necessary surveys, and upon roads and trails preliminary and necessary to the proper performance of the work called for upon and in connection with such works and structures, shall be deemed work done upon and in connection with said work and structures as required in this section.

Sec. 3. That the grantee of any such right of way under this Act shall pay to the United States the full market value of all timber and wood cut, used, or destroyed within or adjacent to the right of way in constructing and maintaining its works, including damages for injuries to the adjacent lands of the United States caused by the digging of any canal or ditch, the laying of any pipe lines, or the construction of any power houses or other buildings appurtenant to the use and operation of the power plant and the flooding of the necessary area for the reservoir or reservoirs, such values and the extent of such damages to be ascertained by or under the direction of the Secretary of the Interior, and if after sixty days' written notice of such ascertained value or damage the grantee, successors, or assigns shall not pay the same, it shall be the duty of the Secretary of the Interior to cause to be instituted an action against said grantee, successors, or assigns in the proper court of the United States within the circuit or district within which said works or some part thereof are situated, for the recovery of such amount or amounts; and in any action so brought the finding and award of the Secretary of the Interior as to such value and damage shall be prima facie evidence of the amount thereof, but the court shall receive and consider all such other evidence as may be offered by the Government, or by the grantee, his successors or assigns, in order to correctly determine the amount of such value or damage, and the same procedure shall be had and taken in such suit or action as provided in law for suits or actions of like character in said court; and the grantee, successors, or assigns shall be liable for the amount required to be paid and for all costs in such suit or action as settled and allowed by the court. And such grantee, successors, or assigns shall be liable to any settler, occupant, or other person beneficially interested whose possession, right, or improvements may be taken or injured by the construction of the works or any of them herein authorized. The grantee hereunder, successors, or assigns, may, in the discretion of the Secretary of the Interior, be required to pay for the use of all or any of the rights and privileges hereby granted prior to patent thereof, not exceeding the following amounts per annum, to wit: For areas and sites for buildings and other structures, including reservoir sites, per acre or fraction thereof, one dollar; for rights of way provided for by section one of this Act, per mile or fraction thereof, one dollar, and shall, before the approval of such map, file with the Secretary of the Interior a bond, in a reasonable amount to be fixed by said officer, conditioned for the faithful observance of each and all of the conditions of this section.

Sec. 4. That any of the persons or corporations referred to in section one of this Act may construct and maintain all necessary roads and trails over any of the lands referred to in section one of this Act for use in connection with the construction and operation of the works and appurtenances herein provided for, with like privileges in connection with the use of materials, earth, and stone for the construction and maintenance thereof; and such roads and trails, when constructed, shall be subject to the free use of the grantee, successors, or assigns, and also to the officers and agents of the Government of the United States and all persons who may desire to use the same. All lands over which said roads or trails pass shall be subject to the right of way therefor, and if disposed of shall be disposed of subject thereto.

Sec. 5. That any existing right of way, license, permit, or privilege for any of the purposes provided for in section one of this Act shall, provided application therefor be made by the grantee or grantees, their successors or assigns, and only in that event, be approved by the Secretary of the Interior under this Act, either by the reapproval of the maps heretofore filed or the filing of new maps, at the option of the applicant, and shall, upon the filing of such new maps or the approval of the maps heretofore filed, be subject to all of the obligations and benefits of this Act.

Sec. 6. That Congress shall have the power at any time to alter, amend, or repeal this Act.

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VOL. XX JANUARY 11, 1908 No. 2

EDITORIAL.

Hydro-Electric Plants in Forest Reserves.

We take pleasure in printing on another page a copy of the Senate Bill Number 2661, which was recently introduced in the United States Senate by Senator Crane, of Massachusetts, a companion bill being introduced in the House. This proposed law is intended to do away with the uncertainty that now exists as to the charge to be made for the manifold requirements of power plants in forest reserves. At present the land occupied by them is not in fee simple, as all permits to occupy these lands may be recalled at the discretion of the Forester. It is of the greatest importance to investors in these enterprises that companies complying with their permit conditions should have irrevocable rights of way and of occupancy for a definite time, long enough to insure stability of investment. The existing law is ambiguous in making no authorization of a charge for right of way over the unreserved public lands, and tends to discourage the development of the water power resources of the West. These facts are evident to all, being well recognized by the Government authorities.

"The Forest Service would welcome legislation on this subject providing for permits somewhat as follows:

"1. A definite term of years, the maximum to be fixed by statute.

"2. A reasonable charge, the maximum to be fixed in each permit when it is issued.

"3. At the expiration of any permit, the old permittee to be preferred, other things being equal, in granting the new permit. If the new permit goes to another he should pay to the old permittee the value of the improvements as appraised by the officers of the Department.

"4. The rate of charge to be reduced where a part of the right of way is on private land, or where an increase of the average annual flow of streams results from storage of water by the permittee."

The new bill as introduced grants locations and rights of way for electric and other power purposes through the public lands and reservations of the United States to citizens and corporations complying with the usual conditions in the purchase of the public lands. A map of the required land having been filed and approved by the Secretary of the Interior, permission is granted to build reservoirs and power plants, and when these are completed the land may be sold for $2.50 per acre, obtaining patent therefor. All damage to timber or land because of their work is to be paid for by the company.

This bill differs from the ideas of the Forest Service chiefly in the manner of compensation to the United States Government for privileges granted. It proposes a flat amount per acre of ground taken and a flat rate per mile of right of way required, instead of basing the charge upon the gross kilowatt output of the electric plants. It is about this point that the discussion centers.

In its view on this question the Journal has not been partisan, nor will it be. For years it has enjoyed the privilege of close co-operation with the officials of the Forest Service, and its columns have always been open for discussion. As has been repeatedly stated, there is no more noteworthy example of the beneficent activity of Government supervision than is exhibited in the intelligent conduct of the Forest Service. The important work that it is accomplishing should be encouraged in every way possible. That the Department is not attempting to increase monetary support by unfair taxation is shown by the high standard that has been attained in previous rulings. Supposing for the sake of argument that they should charge all power companies operating in forest reserves at the rate of twenty cents per thousand kilowatt hours, or make an annual fixed charge of seventy-five cents per theoretical horsepower in the water used, it will be seen that the tax on power delivered will often be twice that actually intended. For the losses in transmission are so high and the possibilities of accident between generator and motor are so many that the power actually used is much less than the dynamo output. The cost of the distributing lines and equipment is one of the greatest connected with a power installation, and if this tax were carried to its extreme conclusion the manufacturer of dynamos and even producers of iron and copper would be called upon to bear their just proportion. In equity it would be far better to charge a fair annual rental with the privilege to pur-

chase provided that the reservation is opened during the time of the lease.

By selling title outright, the Government is relieved of all responsibility of proper care and is also assured of every aid in maintaining roads, trails and fire breaks. The proposed charge would require an expensive board of surveyors and inspectors to insure its enforcement and offers a needless field for possible corruption.

Yet we must realize that any action taken must necessarily be with the approval and assistance of the Forest Service, whose teachings of thrift and efforts at conservation are most essential to our national welfare. A peaceable congress between the electrical powers of the coast and the electoral powers of the nation will do more than any forced legislation to accomplish the desired ends.

PERSONAL.

John Dale, owner of the Dale Company, manufacturers of Dale clusters, fixtures and portables, has been in San Francisco during the past week, and then will go to Los Angeles.

Abington J. Briggs, general manager of the Chicago Telephone Supply Co., was in San Francisco from Los Angeles recently. H. G. Aylesworth now has the San Francisco agency for the Chicago Telephone Supply Co.

Professor D. A. Lyon, of the geology and mining department of Leland Stanford University, Palo Alto, Cal., has been granted a leave of absence of six months to complete experiments upon a new electric smelter in the mines in Shasta County.

R. T. Laffin, who recently resigned the vice-presidency and general management of the Manila street car and electric lighting system, is in San Francisco. Manila now has about fifty miles of electric railway, which, with the electric lighting system, extends far into the suburbs.

The Indiana & Michigan Electric Co. is announced as the corporate name of the South Bend Electric Co., South Bend, Ind.; Buchanan Co., Buchanan, Mich.; Elkhart Electric Co., Elkhart, Ind.; St. Joseph & Elkhart Power Co., South Bend, Ind.; Berrien Springs Power & Electric Co., Berrien Springs, Mich. General offices will be maintained at 220-222 West Colfax Avenue, South Bend, Ind., and branch offices in each of the above-mentioned cities.

The United Railroads of San Francisco have announced the appointment of Joseph H. Handlon as chief claims agent, to fill a vacancy caused by the resignation of A. K. Stevens. Mr. Handlon has been chief clerk in the operating department since 1901. C. I. Kephart has been appointed chief clerk of the operating department. He has been assistant chief clerk for the last four years. Purchasing Agent C. D. Baldwin has also resigned, and his place has been filled by the promotion of Thomas Finigan, his assistant.

OBITUARY.

Dr. Coleman Sellers died December 28th, at Philadelphia, Pa., aged 80 years. As the most active member of the International Niagara Commission, he planned and executed the greater part of the Niagara electric installation. He was an honored member of almost all the engineering and scientific societies of the world. His work as consulting engineer was largely under the firm name of Sellers & Rippey, which is being continued by his surviving partners.

REMOVAL NOTICES.

The opening of the new year finds the electrical center of San Francisco assuming its former location. On New Montgomery Street between Mission and Howard Streets, we find H. W. Johns-Manville Co., Sterling Electric Co., formerly Century-Klein, A. G. Aylesworth, Standard Electrical Co., Van Emon Elevator Co., and the Journal of Electricity, Power & Gas. H. W. Johns-Manville Co. were the first to find permanent location at 159-165 New Montgomery Street in large, well-lighted quarters, giving every facility for the display of their many lines. Adjoining them in the same building the Sterling Electric Co. is now welcoming its friends to the newly occupied commodious ground floor office and salesrooms at 137 New Montgomery. Every aid is given for quick and convenient selection from a large stock of electrical supplies. H. G. Aylesworth has pleasant offices in the same building.

We have already noted the occupancy of 119-121 New Montgomery by the Standard Electrical Works, and recently the Van Emon Elevator Co. has taken the third floor of 111 New Montgomery.

The "Journal of Electricity, Power and Gas" is now permanently established in its new offices in the Technical Building at 111 New Montgomery, and cordially invites its subscribers to make use of the conveniences and comforts freely placed at their disposal. We have files of all the technical periodicals for reference, and are always glad to give information on matters electrical. This new location will be found central and readily accessible.

ELECTRICAL TRADES ASSOCIATION BANQUET.

A banquet is to be given by the Electrical Trades Association of this City at the Fairmont Hotel on Saturday, January 18th. This is a regular yearly affair with the Contractors' Association but they are endeavoring this year, to make it a more prominent one, by asking representation from all the branches, such as Telephone Companies, Electric Railroads, Engineers, Lighting Companies, Electrical Supply Houses, Municipal Departments, Contractors, etc. A social gathering of this kind including all those interested in the trade in any way should be of material benefit to all concerned.

In addition to provision for the inner man, it is proposed to provide enjoyable entertainment for the guests, which gives assurance that every one will have a royal good time. The banquet committee of whom C. E. Wiggin is chairman are working over-time to assure the success of the affair and hope that all the varied interests of the Electrical Trade will render proper aid by their presence and make this one grand affair. The manner in which the request for tickets are coming in assures this.

Cheer up, Boys! See that every one is on hand. The worst is yet to come.

TRADE CATALOGS.

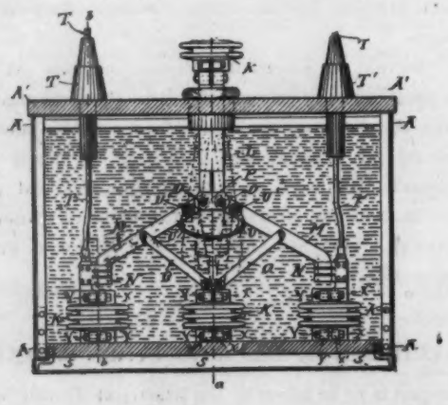
Spencer, Trask & Co., of New York City, send an interesting circular on "Investment Opportunities," showing the present advantages of buying bonds.

The Standard Electrical Works of San Francisco has for free distribution a number of copies of "The Simplex Manual," containing wire tables and data for all sorts of insulated wires and cables; also a booklet from the Jandus Electric Company treating of enclosed are lamp troubles, due to improper conditions of operation, and offering valuable remedial suggestions.

PATENTS

SWITCH FOR HIGH-POTENTIAL CIRCUITS. 874,601. Joseph N. Kelman, Los Angeles, Cal.

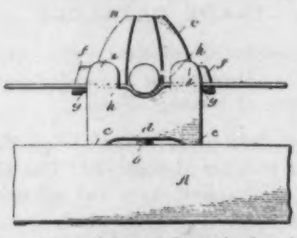
The switch and circuit breaker for high-potential circuits, consisting of two or more pairs of horizontally projecting poles or contact pieces with which oppositely operating switch blades make and break contact, the upper ends of each pair of said blades being connected to a rod of wood or equivalent insulating material, switch blades being pivotally connected near their center of length by links to pivotal connections on an insulator, attached to a beam of wood at the bottom of the tank, the fixed pieces or contact pieces being also attached to insulators fastened to a wooden beam within the tank, the conductors from the fixed poles or contact



pieces extending through insulators carried in the top cover of the tank, consisting of non-conducting material, the ferrules of insulating material at the center of the cover of the tanks, the wooden rods operating in ferrules, the clips connecting an insulator with the top of the wooden rod, the clips connecting the insulator to the channel iron, the connecting pieces and pivots by which the lower end of the wooden rods are connected to the upper parts of the switch blades, a flexible connection between the upper ends of the switch blades, the frames and guides between the center tank and each of the side tanks, the vertical rods operating in said frames and guides, the shaft, the lever and links and the counter weight for opening and closing the switch or circuit breaker.

INSULATOR. 874,445. Albert L. Shears, Seattle, Wash. Filed March 5, 1907, Serial No. 360,749.

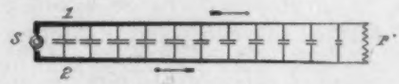
An insulator having a lateral projection and wire-receiving slots diverging from the projection; the outer side of the projection and the outer sides of the outer walls of the slots



being inclined upward and inward, and also having a portion tapered or inclined upward and inward from the upper side of the projection and the mouths of the wire-receiving slots.

SYSTEM OF ELECTRICAL TRANSMISSION AND PROPULSION. 874,411. Maurice Leblanc, Paris, France, assignor to Westinghouse Electric & Manufacturing Company.

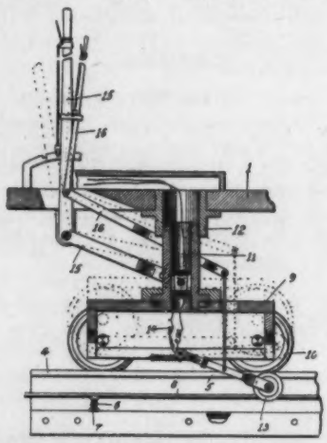
An electrical transmission line, carrying alternating currents of a wave length which is short with reference to the



length of the line, which has the ratio of its capacity to its self-induction artificially increased at points along the line in a manner to prevent the super-elevation of voltage, the consecutive distances between which points are short with reference to a half wave length of the current.

THIRD-RAIL ATTACHMENT FOR ELECTRIC CARS. 874,630. George H. Sohn, Lincoln, Cal.

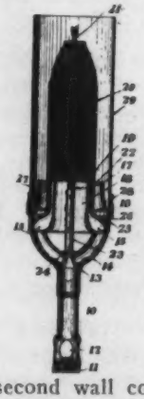
A hollow rail provided with a longitudinal slot in its upper face, a current-carrying wire disposed in rail, a dummy car carrying wheels normally running on rail, a hollow tube



upward from car, an electric car, a tube on the under side of electric car and telescoping first-named tube and means disposed within dummy car and tubes, conveying the current from wire to electric car.

INCANDESCENT GAS LAMP. 874,703. Alcorn Rector, New York, N. Y., assignor to Rector Gas Lamp Company, New York, N. Y.

A structure comprising a burner having a central draft tube, the lower end of draft tube being enlarged, a wall concentric with the draft tube forming a flue between itself and the draft tube, this wall being adapted to enter the lower



end of the mantle, a second wall concentric with the first wall and forming a circular flue delivering outside the mantle, tubes delivering air from the enlarged portion of the draft tube to the outer flue, a bunsen tube, tubes delivering air and gas from the bunsen tube to the inner flue, a motor mounted in the enlarged end of the draft tube and operated by the draft therethrough, and a blower operated by the motor.

INDUSTRIAL

THE DESIGNING OF ALTERNATING CURRENT GENERATORS FOR DIRECT-COUPLING TO STEAM TURBINES.

In articles previously published by this paper attention has been called to the features of construction, adopted by a leading builder of steam turbines, which have placed that company's machines in the position that they now occupy. The revolving field alternators which are direct-coupled to these turbines have been designed, with equal care, to meet the special conditions of turbine operation, an exhaustive study having been made of the successes and failures of earlier types, the good features retained, the bad rejected, and improved construction devised wherever improvements could be made. The objects especially sought were to give high efficiency, combined with simplicity and compactness; and especial attention is paid to the selection of material and methods of construction which insure absolutely safe operation at high speeds.

For the stationary armature of the turbo-alternators, every precaution is taken to secure thorough ventilation, so as to prevent heating of the armature core and winding. The laminated core, made of the best procurable electrical steel, thoroughly annealed and painted, is provided with numerous air ducts, and the cast iron frame is so formed as to assist in the circulation of air.

The armature coils are all completely formed in the shop so that no connections have to be made after the coils are placed in the armature core at the purchaser's station, except the connections of the coil terminals, thus reducing to a minimum the risk of defective insulation at joints. The advantage of this will be appreciated by station operators, especially for high voltage work.

The greatest care is taken in the insulation of the coils by successive drippings and bakings after the application of the various layers of insulation. The coils are firmly secured in the slots, and particular attention has been paid to the form of the coil ends and the securing of the same in such a way as to prevent deformation in case of a short circuit.

The field cores of the Allis-Chalmers Company's turbo-generators are, according to size and conditions, built up either of steel laminations, or of nickel steel forgings, of high magnetic permeability and great physical strength.

The slots formed in the core to receive the field coils are radial; a distinct improvement over constructions in which, to reduce the cost of manufacture, the slots are made parallel to chords of the cross section of the core. That this older form of construction results in complex stresses due to centrifugal force can readily be seen, and its weakness has been proven in practice; moreover, the field coils themselves are subjected to indirect instead of only radial forces, thereby making it difficult to procure an insulation which will not soon be injured by the centrifugal force. The method used, of winding the field with flat strap copper in radial slots, has been made possible by a specially designed forming machine which bends the copper edgewise and gives an increasing spread to each successive turn of the coil. The carefully insulated coils are firmly and substantially held in the slots by means of Parsons manganese bronze wedges. The revolving field is thus formed as a smooth surface cylinder, no matter what the number of the poles, thereby reducing the windage loss, besides tending to quieter operation than is possible with constructions which use projecting poles. Ample spaces are allowed at regular intervals between the laminations or discs of the core, to provide for ventilation of the core itself and of the coils, air being drawn in through openings formed parallel with the axis and discharged at the periphery. The ventilation of the ends of the coils is attained by allowing them to project beyond the ends of the core in such a way that they can be thoroughly cooled; the coils at this point being firmly secured against the effect of centrifugal force by means of nickel steel rings, which form an extension of the core and are provided with openings for the passage of the ventilating air current.

In revolving masses having high rotative speed there is, of course, a tendency to vibration, should the mass be out of balance even to the slightest extent; and if the natural period of such vibration should approximately coincide with the period of vibration of rotation, the cumulative effect may become serious. This is a matter which is too frequently lost sight of by designers, and has resulted in dangerous vibrations in many badly proportioned revolving fields. In the Allis-Chalmers generator particular attention is paid to this feature, and for each machine there have been determined such proportions of shaft as will cause the two periods of vibration to be as widely apart as possible, thus insuring safe and steady operation with minimum tendency to vibration.

For the purpose of obtaining adequate ventilation and for muffling the noise produced by the circulation of the air, these turbo-generators are enclosed in such a manner that the air is taken in at the sides of the machine, passing through fans which discharge it over the end connections of the armature-coils into the bottom of the machine, whence it passes through the ventilating ducts of the core to an opening at the top of the machine.

This system of ventilation is most efficient, as the air which is used for cooling the stator passes through a large and unobstructed area at the outer circumference of the stator, whereas any method of ventilation in which the air passes radially from the inside to the outside of the machine necessitates the forcing of this air through the narrow spaces between the coils. The coils, furthermore, deflect the air so that ventilation of this kind is inefficient, requiring a large amount of power and resulting in poor cooling.

On account of the high speeds of steam turbines and their generators, persons not accustomed to such speeds naturally feel some anxiety as to their perfect safety. This feeling has not been diminished by accidents which have occurred to a number of turbo-generators of a type of construction which has been avoided in the design of these machines, and, for the purpose of reassuring purchasers, Allis-Chalmers Co. has adopted the policy of testing every turbine and generator in its works to a speed twenty per cent in excess of the rated speed, thus subjecting the material to stresses forty-four per cent above the normal. This overspeed test taxes the machine, as it cannot be taxed in practice, for, even should the main governor fail to work, the safety governor will stop the turbine long before it reaches such a speed.

THE ENGINEERING DIGEST.

The Engineering Digest is the new name of Technical Literature, a monthly magazine of technical information for engineers, designers and constructors. It publishes an epitome of current articles in the technical press.

NEWS NOTES

TRANSMISSION.

San Diego.—E. H. Babcock states that the delay in the construction of the power plant for the electricization of the Lajolla line, is caused by the difficulty in getting a site at Morena.

Los Angeles.—The electric power plant of Los Angeles was considerably damaged by fire on December 24th, causing darkness in the city and stopping street car traffic. The roof of the plant was burned and partially fell on the machinery.

Redlands.—Engineer Pearson of the Edison Electric Company, is making surveys for repairing the damage done to the tunnel north of power house No. 1 by a slide which occurred last month. A conduit 500 feet long may be run into the mountain and lined with steel. The cost will be several thousand dollars.

Reno, Nev.—A party of five capitalists of Boise, Idaho, have organized a company known as the Kings Hill Irrigation & Power Company, for the purpose of erecting a power plant near Reno. The men who are back of the project and who have formed the company are Charles and Benjamin Hammett, C. B. Hurtt, E. L. Hice and O. O. Hage, all of Boise.

Santa Fe, N. M.—The Tusas Peak Gold & Copper Mining Co. of Tusas. New Mexico, has made application for a permit to appropriate from the public waters of the Territory of New Mexico. The appropriation is to be made from Wallecitos Creek and is to be conveyed to a power house by means of a dam, pipe and ditch.

Monrovia.—The contract for the installation of a new electric plant at the city well was awarded the Edison Company at a meeting of the City Council. The price is $11,450. The contract provides for a 100-horsepower motor and a cement pit five feet in diameter and 100 feet deep, from the bottom of which a twelve-inch drill will be put down 400 feet.

Oroville.—A. B. Bidwell, of Greenville, who is superintendent of the Meadow division of the Great Western Power Company's property, has commenced the work of obtaining rights of way for a pole line for the transmission of power. By way of explanation, the Meadow division includes all the rights and property of the Great Western Power Company in the vicinity of Prattville, Plumas County.

Oakland.—An entire block in East Oakland at White and Prospect Streets has been purchased for a sub-station by the Western Power Company. The site will be used for the erection of a sub-station at the end of the high tension line to be run from the Big Bend water plant on the Feather River. A main steam plant auxiliary of 30,000 horse-power is to be erected at Sessions basin at the foot of Sixth Street.

San Bernardino.—A project having for its purpose the development of water in the San Bernardino Forest Reserve for electrical purposes is being worked out by A. E. Poole. The government has granted Mr. Poole a right of way two and one-half miles in length. His scene of operations is within the watershed of the San Jacinto mountains. One of the series of power plants arranged for is at Palm Springs, on the desert in Riverside County.

Willows.—The Northern California Power Company, which supplies Willows with electricity, through its branch, the Willows Water and Light Company, has reduced the voltage on its main lines, as well as on the Willows line, from 40,000 to 20,000. This reduction will tend to lessen the accidents which have occurred of late; that is, since the wet weather set in, and also will assure the users of electricity of better service. The high voltage will again be placed on the lines next summer.

Reno, Nevada.—Representatives of the Telluride Power Company of Telluride, Colo., are looking over the ground along the Carson River with a view of purchasing sites for electrical power plants. The intention is to build at least two large plants, if the right power sites can be secured, and to furnish electric power for the mining camps in the western part of Nevada, as well as compete with the Truckee River General Electric Company, which now furnishes power to Reno, Carson and Virginia City.

Oroville.—The construction of the new power station of the Oro Water, Light and Power Company, at Coal Canyon, about eight miles from this city, is completed, and the machinery has been installed. A successful trial of the dynamos has been made. The company now has three power plants within fifteen miles of Oroville. The largest one, with a capacity of 5,000 horsepower, is above Pentz, about fourteen miles distant. The second, with about 2,000 horsepower, is at Coal Canyon, and the third and the oldest is at Thompson Flat, about ten miles from Oroville. The capacity of the last is less than 1,000 horsepower. The same water runs the water wheels of all three.

INCORPORATIONS.

Redwood City.—The Burlingame Water Company has been incorporated with a capital stock of $100,000 by G. F. Lyon, E. L. Hoag, H. T. Scott, G. A. Pope and D. H. McEwen.

Santa Ana.—Articles of incorporation have been filed by the Balboa Oil Company, which has a capital stock of $1,000,000. The incorporators are E. W. Fillette, W. H. Beman, Geo. Huntington, A. H. Wintrode, W. H. Bisbee and J. M. Percy.

Bakersfield.—The Springfield Oil Company has been incorporated with a capital stock of $500,000 by E. H. Loveland, L. C. Ross, H. P. Anderson, W. S. Kimball and A. T. Lightner.

Hanford.—The Mammoth Oil Company of Kings County has filed articles of incorporation with a capital stock of $100,000. T. L. Hannah, of Kingsburg; D. L. Phillips and W. A. Long, of Hanford; J. W. McCord, of Hanford; Chas. Latham, of Grangeville; C. A. Stephens and J. F. Warran, of Laton, are the directors.

POWER AND LIGHT.

Nampa, Idaho.—The new power house being built at this point by the Oregon Short Line for use in generating the power necessary for the block system is nearing completion. The interior is now being finished. It will be some time before the machinery is in place and the block system working, as the work of setting up the posts, etc., has not yet been completed.

Pomeroy, Wash.—The Tucanon Power Company is finishing the installation of the auxiliary power plant in West Pomeroy. This engine is capable of carrying the entire load of lights and power usual in the city. The smokestack is 60 feet high and three feet in diameter. The fly wheel weighs over five tons. This plant will not be used except when the water power fails.

Milton, Wash.—Application was made recently to the Puget Sound Electric Company for current for street lights. The company's reply was that "juice" is too scarce to take any new outside business. The Seattle-Tacoma Power Company also turned down the proposal for the reason that the demand in the field already occupied by the company is too great to permit of extensions into new territory. Now Milton is figuring on a water wheel in Hylebos Creek to make electricity on its own responsibility.

Vancouver, B. C.—The British Columbia Electric Railway Company is making extensive alterations at their power house for the installation of two 500-kilowatt transformers, equivalent to 1,500 horsepower. A portion of the floor for a length of 27 feet and about 10 feet in width is being torn up in the building to admit the concrete foundations to carry this enormous weight of machinery. The capacity of the plant as it is running at the present time is about 1,100 horsepower, and with the additional 1,500 horsepower the plant will be equipped for any emergency. The new switchboard, which will be shortly connected up, is made of finely polished marble and is believed to be the finest in any of the several plants of the company.

Nelson, B. C.—The city council and the Allis-Chalmers-Bullock Company, of Montreal, have locked horns over the machinery supplied by the company for the civic power and light plant at Bonnington Falls. The machinery has been in operation for nearly a year under an understanding between the council and the company, the city not having formally taken over the plant and holding back some $14,000 due the company on its contract. The city declares the machinery not up to contract, refuses payment of the balance and declines to accept the plant. The company asks for a forty-day shutdown to inspect the plant, the city declines to agree, and there the matter rests. In case of trouble, the Kootenay Power and Light Company will furnish Nelson with light and power temporarily.

Wallace, Idaho.—Articles of incorporation of the Northwest Light & Water Company have been filed with the county recorder. Carson City, Nev., is mentioned as the principal place of business, and the company is capitalized at $1,000,000, in shares of the par value of $100 each. The incorporators of the company, together with their holdings, are as follows: Robert E. Strahorn, A. G. Smith, R. J. Danson, and E. D. Doyle. While the report cannot be confirmed in Wallace, it is the general belief that the light and water plants at North Yakima, Wallace, and Sumpter will be consolidated. The owners of the local plant are known to control the others mentioned, and it is believed that the filing of the articles of the Northwest Light & Water Company is simply an initial step toward the merging of the interests.

TELEPHONES.

Stanwood, Wash.—The Pacific Telephone & Telegraph Company is constructing a line two miles north of Cedarhome.

Freewater, Ore.—The rural telephone company has elected the following directors for the coming year: E. P. Jensen, L. B. Nell, C. W. Steen, A. J. Williams, James Kirk. The line will be thoroughly overhauled.

Langley, Wash.—The directors of the Whidby Telephone Company, at their meeting here Monday, decided to run another wire to Clinton in order to give service to the many new settlers that are locating in this vicinity.

Toppenish, Wash.—The Home Telephone Company of Sunnyside, who have long-distance lines running to Toppenish, have their linemen here preparing to install a local system, which will finally be extended over the entire reservation.

Hermiston, Ore.—The Butter Creek Telephone Company is making arrangements to install an exchange in Hermiston the first of the year. It is understood that the company will make improvements here to the amount of about $5,000 in the way of extensions.

Puyallup, Wash.—A franchise for a new telephone system was granted to E. G. Pake. It must be completed within eighteen months. The city will have the use of the poles free for stringing fire alarm wires should necessity arise. It was stated the company is not identified with the Home Telephone Company of Tacoma, but has only arranged for long-distance connection.

Juliaetta, Idaho.—R. H. Porter, manager of the Potlatch Telephone Company, is improving the service. Mr. Porter has divided the farmer lines of Fir and Potlatch ridges into two lines each. There were too many on one line, but as soon as the work is completed there will be one-half the amount on one line as formerly. As soon as the work is completed here, Mr. Porter will start work on a line to Troy.

Kent, Wash.—The Independent Telephone Company, which has had long-distance connection with Seattle for some time, and has sixty farmers on its line around Kent, installed a large switchboard in Jack Kean's store, capable of handling 400 more telephones. They have 100 more subscribers in Kent to serve now and their officials are working now for more business in town. The Independent will soon have a line to Tacoma.

Wallace, Idaho.—The city council has granted Walter C. Clark and Daniel G. Price a franchise to maintain a telephone system in this city in opposition to the Rocky Mountain Bell Company. The system is to be in operation in six months from the date of the first publication of the franchise. The line will connect with the lines already built by Messrs. Clark and Price, and later with the Interstate Company's lines. Wallace has a population of 15,000.

Stites, Idaho.—Work on the Elk City telephone line has been resumed, and it is confidently expected that the busy little mining town will have wire connection with Stites by an independent company. The Stites Telephone and Electric Company, an independent concern, financed by local men, is stringing the wire, and the line will reach Newsome, the half-way station, by the last of the year. The line, when completed, will connect all towns between Stites and Oro Grande, the mining camps all being anxious to have the independent line enter their property.

TRANSPORTATION.

Richmond, Cal.—An ordinance granting to John Nicholl an electric franchise for a street railway, has been adopted by the Trustees.

San Francisco.—The Parkside supplemental franchise on Twentieth Avenue and two blocks of Nineteenth Avenue in Sunset has been passed.

Lakeport, Cal.—The town trustees have passed an ordinance granting an electric railway franchise to the Sonoma & Lake County Railway Company.

Phoenix, Ariz.—Andrew Nielsen, Redmond Toohey and Harry J. Bennett have applied to the Board of Supervisors for a franchise to construct an electric line to Mesa, along the Tempe road.

San Diego.—Bids will be received until January 7 by the Board of Supervisors of San Diego County for a franchise for a railway in the South San Diego Company's addition to San Diego.

Long Beach.—A franchise for the Pacific Electric Company's steam railroad on Ocean Avenue from Golden to Third, has been passed by the City Trustees. It is a fifty-year franchise and carries the privilege of an electric line.

Los Angeles.—Grading has begun for an extension of the Griffin Avenue line easterly through several canyons for a distance of two miles, to the top of Montecito Park addition. The Pacific Electric is to do the work, and the cost will come near $5,000 a mile.

San Francisco.—Since the North Beach plant is in successful operation, General Manager C. N. Black of the United Railroads has made a redistribution of power, which segregates the lines north and south of Market Street and makes the possibility of a complete tie-up of the car system very remote.

San Francisco.—As a result of a conference between President Stafford of the State Harbor Commission and Patrick Calhoun, president of the United Railroads, the three tracks nearest the west side of East Street of the seven that now lie between Market and Mission will be removed, giving 50 or 60 feet more room for teaming.

San Diego.—Work has been begun on the railroad for which a franchise was granted to W. H. Keller and C. H. Kirckhoff of Los Angeles. The line runs from Date and Atlantic Streets to Delmar, 18 miles up the coast toward Los Angeles. It is asserted that the franchise holders are backed by H. E. Huntington and that the proposed road will form a part of an extension of the Pacific electric system from Los Angeles along the coast to San Diego.

Visalia.—The Visalia Electric Railroad Company, now engaged in the construction of an electric car line between Visalia and Lemon Cove, and which will run its cars over the Southern Pacific between this city and Exeter, has obtained a lease of the Southern Pacific tracks between Visalia and Lemoore and will operate cars between these two cities. Work will be commenced on the electricizing of the line between Visalia, Hanford and Lemoore as soon as the line between Visalia and Lemon Cove is in running order.

Los Angeles.—If the deal now in progress between officials of Wells, Fargo & Co. and those of the various electric traction lines in this part of the State is brought to a successful conclusion, there will be a large increase in the service rendered by the express company and a corresponding benefit to people residing in the smaller towns within the Los Angeles territory. The plan is for Wells, Fargo & Co. to take over the business of the smaller express companies doing business on the electric lines, and to extend the service to every station, however small, along those lines. The first step in that direction will be the absorption by Wells, Fargo & Co. of the business of the Los Angeles-Pacific Express Company, which has been operating on Harriman's electric line to Santa Monica, Ocean Park, Redondo and intermediate points. The next step will be a similar arrangement with the Huntington system, and plans have already been laid in that direction. The small parcel business done by these lines is large, and the change will be of great advantage to people living in outlying communities, inasmuch as it will place them in direct express touch with the big railroad systems.

Los Angeles.—That Epes Randolph, representing E. H. Harriman, is expected to come to Los Angeles to re-organize the Los Angeles-Pacific Company is made evident by a statement made by R. C. Gillis, chairman of the executive committee of that corporation. When asked concerning the changes contemplated by the company, including the reduction in force, Mr. Gillis replied: "We will have no material changes except minor consolidation of offices. Our road is financed, and any future plans of reorganization that we have in view will await the arrival of Colonel Randolph." The rumors that General Manager T. R. Gabel would leave the company were denied at the offices in the Los Angeles-Pacific building and also by Mr. Gabel himself. He says: "The Los Angeles-Pacific will not be operated from the Pacific Electric building nor by any one other than its own officers. The financial condition of the company is the same as that of other large organizations throughout the country—thoroughly solvent, but hard up for cash. We just reduced expenses for the time being, but none of the improvements heretofore decided upon will be abandoned for plans changed, except that there will be a temporary curtailment of construction.

OIL.

Los Angeles.—A quarter-million-dollar plant for the manufacture of well tools of all kinds is a prospective addition to Los Angeles industrial projects. The Oil Well Supply Company of Pittsburg, Pa., has leased for a long term of years, the Griffith mill site on North Main Street, adjoining the yards of the Kerckhoff-Cuzner Lumber Company, and there proposes to expend $250,000 in building a factory. J. A. Graves acted for the Griffith estate in making the lease.

Martinez.—It has been rumored that the Bulls Head Oil Works of this city will shortly pass into the hands of a similarly named company from Maine, the consideration being something like $1,500,000. Financial embarrassment is given as the reason for the closing of negotiations which have been pending for some time. The absorbing factor is now to set about to place the works on a paying basis and will enlarge the plant and double the output of both crude and refined oil and kerosene.

FINANCIAL.

Lakeport, Cal.—The town attorney has decided that the water bonds are illegal.

Palo Alto.—The Palo Alto Gas Company is to issue $150,000 in 6 per cent bonds, redeemable in thirty years.

Redding.—The time of delinquency of the assessment of the Pacific Power Company has been extended to Jan. 3rd.

San Francisco.—The annual meeting of the Four Oil Company will be held January 16th, in the Kohl building. W. E. Miles is the secretary.

Visalia.—An assessment of 4 cents per share, delinquent January 20th, sale day February 8th, has been levied on the Devil's Den Oil Company.

Pasadena.—The City Council at its last special meeting voted to limit the municipal lighting bond to be asked for at this time, to $50,000.

Martinez.—The Pacific Telephone & Telegraph Company will hold its annual meeting of stockholders on January 2nd, at Ferry and Ward Streets.

San Francisco.—The annual meeting of the stockholders of the California Fortune Oil Company will be held January 16th, at 1300 Golden Gate Avenue.

Lindsay, Cal.—Assessment No. 16, of $1.60 per share, has been levied on the Nob Hill Water Company. The day of delinquency is January 15, and sale day February 3.

Sacramento.—The State has bought forty water, light and power bonds of the town of Santa Clara. The bonds are of forty years' issue, bearing 4½ per cent interest, and cost the State, with interest, $21,595.87.

Sacramento.—The State of California has bought forty water, light and power bonds of the town of Santa Clara. The bonds are of forty years issue, bearing 4½ per cent interest, and cost the State, with interest accrued, $21,595.87.

Redlands.—The new directors of the Bear Valley Mutual Water Company have chosen officers as follows: H. H. Garstin, president; A. E. Stedling, vice-president; Fred E. Hotchkiss, secretary. Progress was reported on the dam at Fillaree Flats. Later, another dam will be built 100 feet below the present one and 50 feet higher.

San Francisco.—The United Railroads has issued a report of the gross earnings for September, which shows receipts of 367,220, as compared with $423,199 for the same month of the year before, or a decrease of $55,979. The September report is considered by the officials as indicating a rapid return to normal business conditions. This is the third report the company has made since the beginning of the strike last May. The first was for June last, showing gross fares of $152,126, or a decrease of $296,329 as compared with June, 1906, when the receipts were $448,456. The second report was for August last, when the receipts were $317,769, as compared with $429,311 for the same month of the year before, or a decrease of $11,542.

Oakland.—The Realty Syndicate, owners of the Oakland Traction Company, the Key Route Railway System and largely interested in the Peoples Water Company, has decided to resume the issue of its short term investment certificates. These bear 6 per cent interest, payable semi-annually and may be surrendered for cash at any time provided six months written notice be given. In connection with this a statement dated Sept. 30th, 1907, has been issued showing total assets of $11,126,564.65. Of this total the stock of the Oakland Traction Company and the San Francisco, Oakland & San Jose Railway Company, the bonds of the Peoples Water Company and the capital stock of the California Improvement Company, makes $7,338,287.47. The bulk of the remaining assets consists of real estate and mortgages, contracts, etc.

ILLUMINATION.

San Jose.—The United Gas & Electric Light Company has ordered that all the wiring for the cluster lighting project in this city be placed underground.

Escondido, Cal.—Sig. Steiner and W. A. Sickler are active in agitating a campaign for an electric light and power plant, to be owned and operated by the people in connection with their water system, which has been developed.

Las Vegas, Nev.—An ordinance has been passed granting the Consolidated Light & Telephone Company of Las Vegas, Nev., the right to establish, maintain and operate an electric light plant in Las Vegas and for other purposes.

Corona, Cal.—The Corona Gas & Electric Company has made a contract with the Pacific Light & Power Company of Los Angeles, and will extend its line seven miles to connect up with the Pacific Light & Power Company's station at Pedley.

Turlock.—Joseph McDonald, of San Francisco, is trying to secure the assistance of the citizens in erecting a $25,000 gas plant here. He has discussed the matter with a number of leading business men and a petition for signature has been circulated.

Vallejo.—It is now assured that when the proposed bond issue for the enlargement of the municipal water supply is placed before local voters that there will be a proposition calling for the erection of and maintenance of a municipal lighting system.

Redwood City.—An ordinance was presented and adopted by the Board of Supervisors, granting W. J. Martin a franchise to maintain an electric light plant in the first township of this county for lighting and heating purposes and to operate wires and poles in the streets.

Woodland, Cal.—At a called meeting of the city trustees, a resolution was adopted citing the Woodland Gas & Electric Company to appear before the trustees and show cause why the franchise held by the company, known as the "Reith" franchise, should not be forfeited on account of the company's failure to comply with its provisions. The franchise was granted a few years ago and was to run for a period of 50 years.

Riverside.—The fact has developed in connection with the proposition for a new gas company in Riverside that the promotors of this enterprise plan to build a central plant at Colton and to pipe from that point "high pressure" gas to Riverside, Redlands, San Bernardino and probably to Highland. The same people who are exploiting the new company in Riverside are interested in the Home Gas Companies of Redlands, San Bernardino and Colton, and in the Lytle Creek Powers Company.

TELEPHONE AND TELEGRAPH.

Martinez.—The annual meeting of the stockholders of the Pacific Telephone and Telegraph Company is to be held here January 2d.

Modesto, Cal.—D. A. Conant has asked and obtained permission of the Board of Supervisors to erect and maintain a telephone line along the Salida road.

San Francisco.—President Casey of the Board of Public Works has issued an order that no more permits be issued to the Home Telephone Company to open streets for the laying of conduits until the thoroughfares already torn up by the corporation are placed in repair.

Colusa, Cal.—The stockholders of the Colusa County Telephone Company held their regular meeting at Williams last Saturday. The following officers were elected: Charles Schaad, president; W. T. Rathbun, vice-president; and J. M. Jones, secretary. The company expect to establish offices at Williams, Maxwell, Grimes, Princeton and Colusa by January 1st.

San Francisco.—A. S. Macdonald, an Oakland capitalist, and P. E. Bowles, president of the American National Bank of San Francisco, have sold, for $175,000, a frontage on Market Street of 25 feet and depth at that width of 90 feet. Its front on Stevenson Street is 50 feet, which is the width of the rear part of the lot, with a depth of 75 feet, the full depth of the piece being 165 feet. The lot lies between Sixth and Seventh Streets and is to be used for an office and "central" building by the Home Telephone Company.

Butte, Mont.—Former United States Senator W. A. Clark is at work in an effort to settle the troubles between the labor unions and the Rocky Mountain Bell Telephone Company as the result of the sympathetic strike of the linemen and the switchboard operators. He was asked to serve in the capacity of mediator by the labor interests, and has met with representatives from the telephone company and the labor unions. A stumbling block in the way of a settlement is the refusal of the company to remove the injunction recently granted by the Federal Court restraining the unions from any interference with the affairs of the telephone company. Attorneys for the telephone company are busy collecting evidence against the labor leaders implicated in the deportation of non-union linemen from Butte, in violation of the restraining order. The linemen deported have been brought back to Butte and are again at work under a heavy guard of plain-clothes men.

ILLUMINATION.

Globe, Ariz.—Messrs. Cottee and James have sold the electric light and gas plant of this city to A. F. Gressler and W. D. West. Mr. Gressler states that a considerable amount of money will be expended in increasing the capacity of both the electric and gas plants.

Needles, Cal.—C. F. Schrader, who obtained a franchise for a gas and electric lighting plant at Needles, expects to commence the erection of the plant within 90 days, and have it in operation by April 1st, 1908. The franchise is for 50 years and calls for the plant to be completed and running inside of three years. George F. Moser will be general manager and T. A. Johnson secretary and treasurer of the plant.

CLASSIFIED LIST OF ADVERTISERS

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Hunt, Mirk & Co.

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California Electrical Works
General Electric Co.

Aluminum Electrical Conductors
Pierson Roeding & Co.

Annunciators
Electric Appliance Co.
California Electrical Works.
Sterling Electric Co.
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Asbestos Products
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Batteries, Primary
California Electrical Works
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Batteries, Storage
Western Electric Co.
Sterling Electric Co.
Electric Storage Battery Co.

Boilers
Moore, C. C. & Co., Inc.
Standard Electrical Works
Tracy Engineering Co.
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Boiler Compounds
Dearborn Drug & Chem. Wks.
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Buffers
Northern Electrical Mfg. Co.
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Building Material
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Circuit Breakers
Fort Wayne Electric Works
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Condensers
O. C. Goeriz & Co.
Moore, Chas. C. Co., Inc.
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Conduits
American Circular Loom Co.
Electric Appliance Co.
Sterling Electric Co.

Conduit Fixtures
Century-Klein Electric Co.
Electric Appliance Co.

Cooling Towers
O. C. Goeriz & Co.
Moore, Chas. C. Co., Inc.
Tracy Engineering Co.

Cross Arms
Sterling Electric Co.
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Dynamos and Motors
Brooks-Follis Elec. Corp.
California Electrical Works
Crocker-Wheeler Co.
Electric Appliance Co.
Sterling Electric Co.
Fort Wayne Electric Works
General Electric Co.
Holtzer-Cabot Elec. Co.
Northern Elec. Mfg. Co.
Standard Electrical Works
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Elevators
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Johns-Manville Co., H. W.
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Electric Grinders
California Electrical Works
General Electric Co.
Northern Electrical Mfg. Co.

Electric Heating Devices
Electric Appliance Co.
General Electric Co.
Johns-Manville Co., H. W.

Electrical Instruments
Electric Appliance Co.
Cutter Co., The
Sterling Electric Co.
Fort Wayne Electric Works
General Electric Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & Mfg. Co.
Weston Elec. Instrument Co.

Electrical Machinery
Crocker-Wheeler Co.
California Electrical Works
Electric Appliance Co.
General Electric Co.
Northern Electrical Mfg. Co.
Standard Electrical Works
Century-Klein Electric Co.

Electric Polishers
Northern Electric Mfg. Co.

Electric Railway Appliances
Pierson, Roeding & Co.
General Electric Co.
Johns-Manville Co., H. W.

Electrical Supplies
California Electrical Works
Sterling Electric Co.
Electric Appliance Co.
General Electric Co.
Standard Electrical Works
Johns-Manville Co., H. W.

Electric Ventilating Fans
Sterling Electric Co.
California Electrical Works
General Electric Co.
Northern Electrical Mfg. Co

Engines, Boilers, Heaters, etc
Moore, Chas. C. Co., Inc.

Engineers, Chemical
Smith, Emery & Co.
Moore & Co., Chas. C., Inc.
Standard Electrical Works
Tracy Engineering Co.
Westinghouse Machine Co
Hunt, Mirk & Co.

Engines, Gas and Gasoline
Moore & Co., Chas. C., Inc.
Westinghouse Machine Co.
Hunt, Mirk & Co.

Engineers and Contractors
Brooks-Follis Elec. Corporat'n
Byllesby & Co., H. M.
California Electrical Works
Cannon, Edward F.
Hunt, Mirk & Co.
Century-Klein Co.
Copeland, Clem A.
Cory, C. L.
General Electric Co.
Hunt, Dillman, Meredith & Allen
Jackson, D. C. & W. M.
Smith, Emery & Co.

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